

WHAT IS CLAIMED IS:

1. A rotary tuning element, comprising:
a variable transmission filter, having a transmission wavelength that varies as a function of rotation angle; and
a compensation prism having a thickness that varies as a function of rotation angle, the compensation prism usable to alter a cavity length of an external cavity laser to correspond to the transmission wavelength of the variable transmission filter.
2. The rotary tuning element of claim 1, wherein the transmission wavelength of the variable transmission filter varies substantially linearly across a diameter of the rotary tuning element.
3. The rotary tuning element of claim 2, wherein the thickness of the compensation prism varies substantially linearly across a diameter of the rotary tuning element.
4. The rotary tuning element of claim 1, wherein the transmission wavelength of the variable transmission filter varies to provide multiple transmission wavelength cycles around a track concentric with an axis of rotation of the rotary tuning element.
5. The rotary tuning element of claim 4, wherein the thickness of the compensation prism varies to provide multiple thickness cycles around a track concentric with an axis of rotation of the rotary tuning element.
6. The rotary tuning element of claim 1, further comprising at least one respective feature that interacts with at least one respective sensor to provide at least one respective signal indicative of at least one respective angle of rotation of the rotary tuning element, wherein the at least one respective feature comprises at least one of a) a trigger feature and b) a rotary encoder scale feature.
7. The rotary tuning element of claim 1, wherein the transmission wavelength of the variable transmission filter varies to provide multiple transmission wavelength cycles along a direction parallel to a diameter of the rotary tuning element.
8. The rotary tuning element of claim 1, wherein the thickness of the compensation prism varies to provide multiple thickness cycles along a direction parallel to a diameter of the rotary tuning element.
9. The rotary tuning element of claim 1, further comprising an etalon, having a transmission wavelength that varies as a function of rotation angle in a manner that corresponds to the transmission wavelength of the variable transmission filter.

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10. The rotary tuning element of claim 9, wherein the etalon is a wedge air-gap etalon.
11. The rotary tuning element of claim 9, further comprising a second etalon having a transmission wavelength that varies as a function of rotation angle in a manner that corresponds to the transmission wavelength of the variable transmission filter.
12. An external cavity laser, comprising
 - a laser diode;
 - a reflector; and
 - the rotary tuning element of claim 1, operably disposed along an optical path between the laser diode and the reflector.
13. The external cavity laser of claim 12, further comprising at least one optical isolation element disposed along the optical path.
14. The external cavity laser of claim 12, further comprising at least one lens disposed along the optical path.
15. The external cavity laser of claim 12, further comprising a rotary motor usable to rotate the rotary tuning element.
16. The external cavity laser of claim 12, wherein:
 - the rotary tuning element further includes at least one respective feature that interacts with at least one respective sensor to provide at least one respective signal indicative of the at least one respective angle of rotation of the rotary tuning element, wherein the at least one respective feature comprises at least one of a) a trigger feature and b) a rotary encoder scale feature, and the external cavity laser further comprises at least one respective sensor usable to detect the at least one respective feature.
17. The external cavity laser of claim 15, wherein:
 - the rotary motor is coupled to an axle that is coupled to the rotary tuning element :
 - the rotary tuning element has a radius sufficiently large that the motor, coupled to the rotary tuning element, may be disposed adjacent to the laser diode along a direction transverse to the optical path.
18. The external cavity laser of claim 15, wherein the external cavity laser is operable to provide a variable wavelength output that repetitively varies without the use of reciprocal motion.

19. The external cavity laser of claim 18, wherein the external cavity laser is operable to provide a mode-hop-free variable wavelength output that repetitively varies without the use of reciprocal motion.

20. The external cavity laser of claim 19, wherein the external cavity laser is operable to provide a mode-hop-free variable wavelength output that repetitively varies at a frequency of at least 100 Hz.

21. The external cavity laser of claim 18, wherein the external cavity laser is operable to provide a mode-hop-free variable wavelength output that repetitively varies over a precisely repeated wavelength range without depending on precise motion control.

22. The external cavity laser of claim 18, wherein the rotary tuning element includes a pattern that is replicated multiple times around the rotary tuning element as a function of rotation angle and the external cavity laser is operable to provide a variable wavelength output that repetitively varies at a frequency of at least 1,000 Hz.

23. The external cavity laser of claim 22, wherein the external cavity laser is operable to provide a variable wavelength output that repetitively varies at a frequency of at least 10,000 Hz.